

Heterogeneous preferences for altruism: gender and personality, social status, giving and taking

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Abstract Some of the earliest work on heterogeneity in social preferences focuses on gender differences in behavior. The source of these gender differences is the main interest of this paper. We report on dictator game experiments designed to identify heterogeneity of other-regarding preferences according to personality, gender, status, and whether the choice is framed as giving or taking. We find that the effect of gender on giving is more subtle than previously understood, and is explained collectively by various personality factors. We also find that women, high status treatment individuals, and individuals in the giving language treatment give less, and are also less sensitive to the price of giving.

Keywords Altruism · Status · Gender · Framing effects · Personality

JEL Classification A13 · C91 · D01 · D63 · D64

1 Introduction

It has been well established that economic models can rationalize other-regarding behavior in the dictator game by including the other player's payoff in the decision

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maker's utility function (Andreoni and Miller 2002). As is the case with preferences for consumption goods, it is reasonable to suspect that this preference varies from person to person. Some of the earliest work on heterogeneity in social preferences focuses on gender differences. Eckel and Grossman (1998) find that women, on average, are more likely to give to others and are more generous than men. Andreoni and Vesterlund (2001) expand on this, and find that while men and women are equally generous on average, men are more generous when it is cheap to give, and women are more generous when it is expensive to give, so that preferences differ in functional form as well as overall weight.

The source of this gender heterogeneity is the main focus of this paper. In particular, we are interested in whether or not personality characteristics can help us understand differences in behavior typically observed between men and women. A better understanding of the source of heterogeneity of preferences can inform and improve models of rational human behavior.

We use a dictator game experiment in order to explore the relationship between gender and personality in explaining other-regarding preferences. As in Andreoni and Miller (2002), we include a within-subjects treatment of exogenous price variation, allowing us to examine differences in price sensitivity between men and women. In order to allow for sources of variation in addition to gender, we also include two additional treatments—one involving the status of the dictator and/or the recipient and the other that introduces a language-induced framing effect.

2 Literature review

Personality is a potential source of heterogeneity in other-regarding preferences. Brandstatter and Guth (2002) explore differences in equity considerations by measuring self-reported benevolence and other personality traits in conjunction with behavior in dictator, ultimatum, and hybrid games. They find that individuals balance narrow self-interest with equity considerations in sophisticated and probably systematic ways. Other recent research (Boone et al. 1999; Koole et al. 2001; LePine and Van Dyne 2001) has linked propensities for altruistic behavior to personality factors.

In addition to their connections to other-regarding behavior, gender and personality are likely to be related to one another. Schmitt et al. (2008) document gender differences in Big Five personality factor measurements across 55 different countries. They find that in most countries female report higher levels of Neuroticism, Extraversion, Agreeableness, and Conscientiousness than do males, while males report more Openness, and that these differences are greater in countries with higher levels of human development.

We are not the first to explore the connections between gender, personality, and other-regarding behavior. Ben-Ner et al. (2004) conduct dictator experiments in which males and females are asked to split an endowment with a completely unknown subject or a subject with a known gender. They find that the additional gender information about the recipient significantly affects females, who give less to females than to males and those of unknown gender. They also find that giving behavior is correlated with Big Five personality factors and Wonderlic cognition scores, especially

for females. Our paper differs from theirs in that we include several other possible sources of heterogeneity, and also allow for heterogeneity in price sensitivity.

Finally, Swope et al. (2008) use a Myers-Briggs personality test to examine the connection between personality type and laboratory behavior in dictator, ultimatum, trust, and prisoner's dilemma games. They find some evidence that individuals who are more extraverted in orientation and feeling in judgment are generally more cooperative than others. They also find little difference in behavior by gender when controlling for personality type, but their sample comes from US Naval Academy students, a largely homogeneous population (mostly white males), who undergo rigorous and perhaps life-altering physical and academic training together. Furthermore, their experiment involves one-shot games. As a result, they cannot look for differences in price sensitivity or consistency with axioms of revealed preference, which we can do within our framework.

Our status treatment utilizes the protocol of Ball et al. (2001) and Kumru and Vesterlund (2008) to manipulate the status of the subjects in our experiment. Because Kumru and Vesterlund (2008) find evidence of an effect of status with regards to contributions to a public good, we hypothesize that status could also play a role in behavior in dictator games, with different groups potentially being treated differently by individuals with different levels of status.

In addition, it seems likely that how an individual responds to their high or low status could be moderated by different aspects of their personality. For example, Cox and Deck (2006) find that females are more opportunity cost-sensitive in their giving than males, and that social distance is one of the important factors in explaining this difference. In a distributive power game, Brandts et al. (2006) find that knowingly selected allocators are more generous than randomly selected allocators, and this could be interpreted as a measure of status or perhaps social distance.

The framing treatment follows Andreoni (1995) and uses the same decision framed in one of two ways. In one case the problem is presented to the decision maker as one in which they have been given tokens which they may choose to share with the other player. In the other frame, the other player has the tokens and the decision maker can take some (or all) of them away. In Andreoni (1995), which uses a public goods game, framing effects are either positive or negative in that they frame the type of externality being imposed on others by decision makers.

Decision makers in our experiment impose either positive or negative externalities on the other person that they are paired with; this must be true by definition because the dictator game is a zero-sum game. Andreoni (1995) finds a substantial framing effect, and argues that it could be because the negative frame somehow makes incentives more obvious to the subject. However, variation across subjects and the source of the framing effect are not studied further. In light of the potential relationship of positive and negative framing effects to social distance, it seems very likely that personality would interact with this language difference. The inclusion of different endowment levels and exchange rates allow us to consider the role of price sensitivity in these decisions.

3 Experimental design and subjects

In the modified dictator game used here, a subject is asked to allocate a fixed payoff between himself and another subject over a series of different budgets with different relative prices of own-payoff and other-payoff. This design comes from Andreoni and Miller (2002). It allows us to examine behavioral variation in response to price changes, and check for consistency with revealed preference axioms. In order to keep sessions to a reasonable amount of time we reduced the number of choices to be made within each treatment and include only five of the eleven used by Andreoni and Miller (2002).

The experiment was conducted at Sonoma State University with students recruited from the campus at large via email.¹ There were six sessions averaging 17.7 subjects, the smallest with 12 subjects and the largest with 22. 69 out of 106, or 65%, of the subjects were female, which is roughly equivalent to the general campus population. On average subjects earned \$9.21 plus a \$5 show up fee for a session that lasted approximately 45–55 minutes.

In each session, subjects were brought into a room with four rows of tables and chairs, and asked to take a seat. Two rows of tables were near the front of the room and two rows in the back. There was exactly one chair for each of the subjects participating in the session. Subjects were told that they will be paid in cash for participating, and the amount earned depends on the decisions made in the experiment. They were told that a research foundation had provided the funds for the experiment, and that it will take about an hour. Then they were given a consent form to read and sign.

In order to exogenously manipulate status and keep it orthogonal to ability, we followed the procedure used by Ball et al. (2001) and also by Kumru and Vesterlund (2008). Subjects were assigned high status (Star Group) according to answers on a trivia quiz (see electronic supplementary material for quiz). However, rather than make the assignments based on correct answers, subjects were ranked according to their numerical answer to one of the questions on the quiz, thus resulting in a random ordering of subjects. We only tell subjects that their “answers on the quiz determine whether you are in the Star Group or not.” This involves a small amount of deception, but is consistent with the standards of the American Psychological Association guidelines and other social science experiments, as no severe emotional distress is likely to be caused (Ball et al. 2001).² This procedure is designed to convince subjects of a status difference, and, since the assignment is actually made randomly, it also allows us to avoid an endogeneity between status and intelligence or some other unobserved factor.

Quizzes were handed out to each subject with a claim check number included. The claim check number identifies each subject throughout the experiment, and also allows them to claim their cash payment at the end. Subjects were allowed some time to complete the quiz, and once all were finished the quizzes were collected and scored according to the procedure outlined above.

¹Students who had taken upper division courses from one of the researchers were to be excluded, but no such students responded to the email solicitation. The complete protocol, including questionnaire, are available on the journal website.

²See APA standards at <http://www.apa.org/ethics/code2002.html>.

Once the quizzes were scored a ceremony was held to identify those subjects who make up the Star Group, indicating high status. They were asked to come to the front of the room and were handed a shiny black folder with gold stars on it. Once all Star Group subjects were at the front of the room, a round of applause was called for. Star Group subjects were then asked to take a seat at the front of the room, and everyone else was asked to sit in the back. Prominent gold stars hang on the walls in the front of the room, and we placed gold star sandwich boards at each table setting. Once all Star Group subjects were seated, the remaining participants were given plain manila folders.

Inside each subject's folder were the Decision Sheets which subjects used to mark their token allocation choices. The subjects were told that their task is to allocate a fixed number of tokens between themselves and an anonymous person randomly chosen from the group. They were asked to make 20 different allocation decisions under four different scenarios: (1) the other player is in the Star Group and has the tokens, (2) the other player is not in the Star Group and has the tokens, (3) the other player is in the Star Group and you have the tokens, and (4) the other player is not in the Star Group and you have the tokens. No tokens were actually handed out before the decisions, so stating whether or not a subject starts with the tokens is a language-induced framing effect. We refer to the framing effect treatments as Giving ("you have the tokens") or Taking ("other player has the tokens") treatments. This language treatment is included with the status treatment in a two by two design.

Each of the allocation problems within a scenario differed in the number of tokens to be divided and the number of points a token was worth to each subject. However, the same five budgets were used in each of the four different scenarios and all subjects received the same set of decision problems, though the order in which they appeared was randomized within and across scenarios in order to mitigate order effects.³

Tokens were worth 1, 2, or 3 points each, and the total tokens available were 40, 60, 75, or 100, so as to produce the 5 choice sets shown in Fig. 1 and Table 1. Each of these choice sets was used in each treatment cell. Subjects were told that they could hold tokens or pass them to the other player. Decisions were indicated by filling in the blanks in statements like the following: "Divide 75 tokens: Hold _____ @ 1 point each, and Pass _____ @ 2 points each." The subjects were told that each point earned would be worth \$0.20 in payoff.

The varied token values constitute the subjects' budget in terms of payoffs. Consider Budget 1. Transferring a token raises the other subject's payoff π_o by 3 points and reduces one's own payoff π_s by 1 point. So, one can think of the token endowment as income, the price of self-payoff p_s as the inverse of the hold value, and the price of other payoff p_o as the inverse of the pass value.

At the conclusion of the experiment, subjects were asked to complete an exit survey while their cash payments were prepared. There were three sections to the exit survey. The first section included 15 questions on how subjects were assigned to the

³Due to the number of different scenarios and the number of different budgets the number of different possible orderings made it impractical to directly control for order effects. No order effects were found in the aggregate.

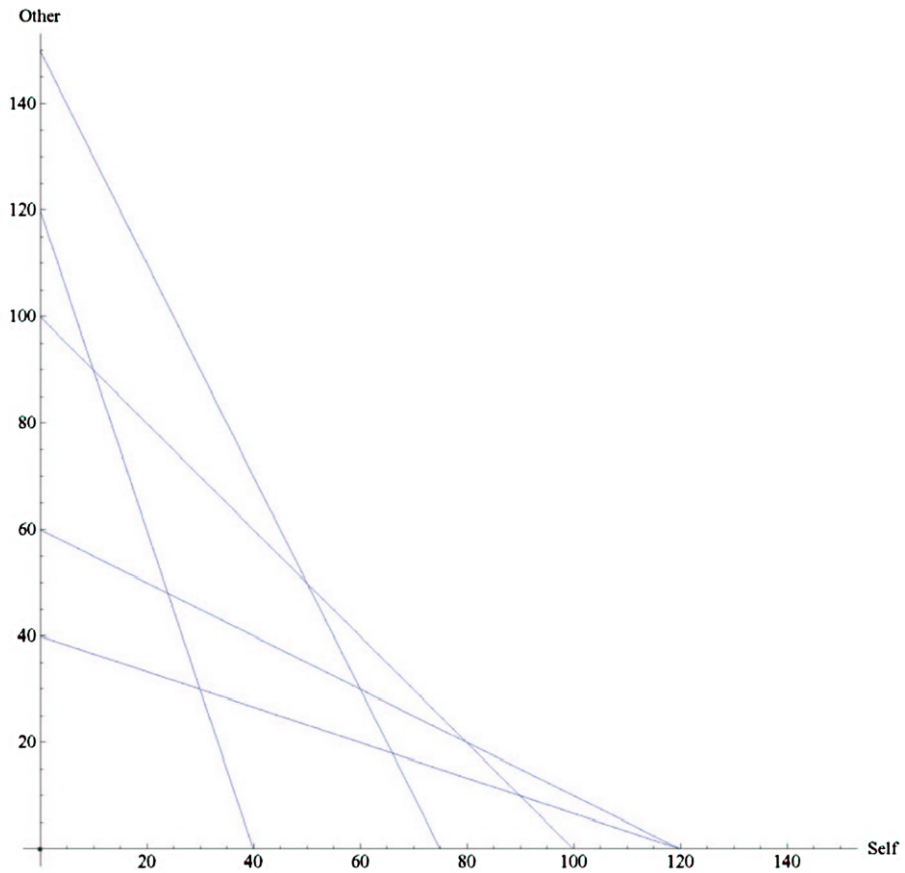


Fig. 1 Budget constraints

Table 1 Allocation choices

Budget	Token endowment	Hold value	Pass value	Max money payout	p_s (π_s price)	p_o (π_o price)	Relative price of other payoff (p_o/p_s)
1	40	1	3	24	1.00	0.33	1/3
2	75	1	2	30	1.00	0.50	1/2
3	100	1	1	20	1.00	1.00	1
4	60	2	1	24	0.50	1.00	2
5	40	3	1	24	0.33	1.00	3

Star Group, how they felt about the performance and power of the Star Group, and how they felt about their own performance. The second section included 33 questions on socioeconomic information. The third section included 50 questions designed to

Table 2 Personality factors by gender

Personality factor	All subjects	Male	Female	t-stat
Extraversion	33.53 (0.75)	33.94 (1.38)	33.40 (0.91)	0.34
Agreeableness	38.77 (0.48)	37.36 (0.99)	39.52 (0.48)	2.21 ^b
Conscientiousness	34.23 (0.66)	34.00 (1.40)	34.53 (0.69)	0.38
Emotional stability	28.60 (0.38)	30.47 (0.64)	27.58 (0.43)	3.89 ^c
Intellect or imagination	35.72 (0.37)	36.11 (0.67)	35.51 (3.71)	0.77

Standard errors in parentheses

^aSignificant at 10%;^bsignificant at 5%;^csignificant at 1%

measure personality according to the five-factor personality model.⁴ Table 2 reports average scores on the five personality factors for all subjects and by gender. Notice that there are statistical differences between male and female subjects in two of the five factors, Agreeableness and Emotional Stability. The complete quiz, experimental protocol, and exit survey can be found in the electronic supplementary material.

4 Results

4.1 Summary of treatment effects

First, we check for rationality by looking for violations of the Generalized Axiom of Revealed Preference (Varian 1982). Subjects have a mode of 0 violations, and a mean of 0.89 (out of a maximum possible 5 violations).⁵ As a test of power, if individuals had chosen randomly from the distribution of observed choices, a bootstrap simulation gives an average of 2.3 violations. These results are broadly consistent with those reported in other revealed preference experiments, and suggest that the subjects are choosing purposively, if not always with perfect rationality.

Next, in order to provide a basis of comparison to the previous literature, we use summary statistics to look for differences in other-regarding behavior, as measured by the amount of money passed to the other player, across genders, status, and language.⁶

⁴International Personality Item Pool: A Scientific Collaboratory for the Development of Advanced Measures of Personality Traits and Other Individual Differences (<http://ipip.ori.org/>). In this paper we use a standard psychological personality inventory, based on survey responses by the subjects immediately after the experiment. This survey is used to describe an individual's personality along five roughly orthogonal factors: Extraversion, Agreeableness, Conscientiousness, Emotional Stability versus Neuroticism, and Intellect or Openness. The Big Five, as these factors have been called (Goldberg 1981), are measured using self-reported responses to 50 questions (see the electronic supplementary material for examples). See Goldberg (1981, 1990) and McCrae and Costa (1990) for additional reading.

⁵We follow the method for counting violations of GARP used by Harbaugh et al. (2001), which says: "For each of the choices we count one violation as occurring if that choice, in combination with any of the other choices, violates GARP."

⁶The analysis was repeated using alternative measures of other-regarding preferences such as 'percent of maximum possible money payout realized' and 'percent of maximum possible money payout passed to

Table 3 Mean money payoff to other party by gender

Budget	Token endowment	Income (\$ value of endowment)	Relative price	All subjects	Male	Female	t-stat
1	40	\$8	1/3	11.084 (0.548)	13.479 (1.105)	9.909 (0.561)	2.90 ^c
2	75	\$15	1/2	14.457 (0.685)	17.133 (1.306)	13.125 (0.754)	2.68 ^c
3	100	\$20	1	8.549 (0.307)	8.729 (0.669)	8.507 (0.317)	0.30
4	60	\$24	2	4.340 (0.222)	3.764 (0.420)	4.660 (0.255)	1.84 ^a
5	40	\$24	3	2.873 (0.172)	2.483 (0.312)	3.088 (0.205)	1.63
Average				8.261 (0.276)	9.118 (0.570)	7.858 (0.288)	1.99 ^b

Standard errors in parentheses adjusted for clustering on subjects

^aSignificant at 10%; ^bsignificant at 5%; ^csignificant at 1%

Table 3 reports outcomes for each budget set by gender.⁷ Across all five budgets on average males passed \$9.12 and females passed \$7.86, a statistically significant difference at the 5% level. This might be interpreted as evidence that males are more generous than females. However, this result is not uniform across different relative prices of giving. As the relative price of giving increases from 1/3 to 3, both genders decrease the amount passed, but, as in Andreoni and Vesterlund (2001), males are more sensitive to price than females. In our data, males give significantly more than females at prices of 1/3 and 1/2, and less when the price is 2 (at 10% significance) or 3 (the correct sign, but lacking statistical significance). Males also exhibit more variance at each price than females.

Table 4 reports mean outcomes for each budget set by status treatment. Recall that players are paired with people of their own status and the other status level and note that here we pool across recipient status. The results show that across all budgets, high status subjects passed an average of \$8.01 while low status subjects passed an average of \$8.53, and this difference is not statistically significant. Low status subjects pass more than do high status subjects when the cost of giving is low and slightly less when the cost of giving is higher, but the only difference that is statistically significant is

the other player.' These measures would account for preferences for efficiency and egalitarian division as alternative interpretations of other-regarding preferences. Results are robust to these alternative measures.

⁷These results are generated using OLS regression with standard errors clustered on subjects. This allows us to control for any subject level variation in our data. For the 'All Subjects' column, each budget represents a separate regression on only a constant term. In the 'Male' and 'Female' columns, the same technique is used on subsets of the data that contain only male or only female subjects. Finally, the 't-stat' column reports the t-statistic from an OLS regression on the entire data set with a male/female indicator variable, again clustering on subjects. We repeated the analysis using standard t-tests without clustering and the results are similar.

Table 4 Mean payoff to other party by own status

Budget	Token endowment	Income (\$ value of endowment)	Relative price	All subjects	Low status	High status	t-stat
1	40	\$8	1/3	11.084 (0.548)	11.634 (2.870)	10.556 (2.928)	18.70 ^b
2	75	\$15	1/2	14.457 (0.685)	15.296 (2.785)	13.648 (1.904)	1.87
3	100	\$20	1	8.549 (0.307)	8.562 (2.239)	8.537 (1.652)	0.04
4	60	\$24	2	4.340 (0.222)	4.305 (1.518)	4.374 (1.391)	0.54
5	40	\$24	3	2.873 (0.172)	2.809 (1.191)	2.934 (0.947)	0.51
Average				8.261 (0.276)	8.521 (2.121)	8.010 (1.764)	1.43

Standard errors in parentheses adjusted for clustering on language treatment

^aSignificant at 10%; ^bsignificant at 5%; ^csignificant at 1%

when the price is 1/3. Overall, low status individuals show more sensitivity to price than do high status individuals. While no direct comparisons can be made to Ball et al. (2001) or Kumru and Vesterlund (2008), results in both of those experiments (competitive market and voluntary contribution games, respectively) show that high status individuals end up with greater payoffs than do low status individuals. These results collectively may indicate some degree of heightened self-interest as a result of the high status treatment.

Table 5 reports mean outcomes for each budget set by language treatment. Subjects in the Taking treatment leave the other players with an average of \$10.20, compared to \$6.32 in the Giving treatment, statistically significant at the 10% level, and subjects in the Taking treatment pass more in all five budgets. Interestingly, price responsiveness is much greater in the Taking treatment than in the Giving treatment. So, while subjects in the Taking treatment tend to leave the recipients with more than in the giving treatment, they also appear to be more price sensitive. Andreoni (1995) shows that there is a “behavioral asymmetry” across frames, and we appear to find a similar result in our experiment using a different framing treatment. Furthermore, recent work by Krupka and Weber (2009) uses a norm elicitation procedure to help explain differences in behavior between a ‘standard’ and ‘bully’ version of the dictator game.⁸ They find that differences in the degree of ‘social appropriateness’ of various choices explain the larger percentage of 50/50 splits in the bully version and, when the 50/50 allocation is not selected, the higher percentage of ‘bully’ dictators that leave the other player with zero. It seems reasonable that similar social

⁸The standard game involves a pot of 10 one-dollar bills and is framed with the dictator starting with all 10. The bully version also involves 10 one-dollar bills, but the frame describes the initial allocation as \$5 each.

Table 5 Mean payoff to other party by language treatment

Budget	Token endowment	Income (\$ value of endowment)	Relative price	All subjects	Taking	Giving	t-stat
1	40	\$8	1/3	11.084 (0.548)	13.984 (0.510)	8.185 (0.568)	100.62 ^c
2	75	\$15	1/2	14.457 (0.685)	16.793 (1.264)	12.121 (0.383)	5.30
3	100	\$20	1	8.549 (0.307)	10.489 (0.306)	6.609 (0.281)	6.61 ^a
4	60	\$24	2	4.340 (0.222)	5.793 (0.0291)	2.887 (0.098)	22.77 ^b
5	40	\$24	3	2.873 (0.172)	3.940 (0.059)	1.806 (0.185)	8.73 ^a
Average				8.261 (0.276)	10.200 (0.434)	6.322 (0.077)	10.89 ^a

Standard errors in parentheses adjusted for clustering on status treatment

^aSignificant at 10%; ^bsignificant at 5%; ^csignificant at 1%

norms could explain the differences that we observe between the two frames in our experiment.⁹ Finally, in both Tables 4 and 5 notice that as the relative price of giving increases the differences in behavior according to the treatment variable tend to disappear. This suggests that there may be an interesting interaction between economic costs of other-regarding behavior, and costs associated with deviating from social norms. This is intuitive: when giving is cheap, there is a greater potential for social norms to influence other-regarding behavior. More generally, it is reasonable that the degree of social appropriateness of various behaviors may be conditional on price.

4.2 Gender and personality

In this section we use regression analysis in order to examine the relationship between gender, price, personality, and other treatments in explaining other-regarding behavior.

Table 6 contains random effects estimates¹⁰ for the amount passed to the recipient in five different specifications. The baseline specification is presented in the first column. The coefficients on the relative price, female, and giving variables are all negative and significant. Column 2 adds price-treatment interaction variables. The coefficient on the price-female interaction variable is positive and significant, again indicating that females are less responsive to price than are males, as in Andreoni and

⁹Note that the comparison between our two experiments is not exact. Krupka and Weber (2009) do not vary the price of giving as we do and their ‘bully’ version, while similar to our ‘taking’ frame, starts at a 50/50 split whereas our version starts with all of the tokens with the other player.

¹⁰We also estimate mixed model specifications, allowing for random effects on both subjects and gender. The results are very similar.

Table 6 Demand for altruism. Dependent variable is payoff to other subject, random effects

	1 Baseline	2 Baseline with interactions	3 Personality	4 Female- personality	5 Female-price- personality
Relative price	−3.933 ^c (0.139)	−6.106 ^c (0.344)	−6.156 ^c (0.356)	−6.156 ^c (0.356)	−6.751 ^b (3.234)
High status	−0.584 (0.547)	−1.582 ^b (0.664)	−1.596 ^b (0.697)	−1.698 ^b (0.705)	−2.791 ^c (1.079)
Female	−1.382 ^b (0.579)	−3.897 ^c (0.702)	−3.693 ^c (0.781)	−0.013 (8.811)	−3.105 (10.758)
Other high status	0.04 (0.279)	0.041 (0.464)	0.084 (0.489)	0.084 (0.489)	0.084 (0.486)
Giving	−3.816 ^c (0.279)	−5.442 ^c (0.464)	−5.545 ^c (0.489)	−5.545 ^c (0.489)	−5.545 ^c (0.486)
Price x high status	—	0.730 ^c (0.276)	0.742 ^b (0.292)	0.742 ^b (0.292)	0.804 ^c (0.301)
Price x female	—	1.840 ^c (0.290)	1.909 ^c (0.303)	1.909 ^c (0.303)	3.649 (4.537)
Price x other high status	—	−0.000 (0.274)	−0.018 (0.289)	−0.018 (0.289)	−0.018 (0.287)
Price x giving	—	1.190 ^c (0.274)	1.192 ^c (0.289)	1.192 ^c (0.289)	1.192 ^c (0.287)
Extraversion	—	—	0.006 (0.039)	−0.042 (0.066)	−0.042 (0.081)
Agreeableness	—	—	0.044 (0.067)	0.101 (0.087)	0.209 ^a (0.109)
Conscientiousness	—	—	−0.053 (0.043)	−0.106 ^a (0.060)	−0.280 ^c (0.073)
Emotional stability	—	—	0.187 ^b (0.084)	0.406 ^c (0.147)	0.740 ^c (0.179)
Intellect or imagination	—	—	−0.107 (0.080)	−0.220 (0.135)	−0.471 ^c (0.165)
Female x extraversion	—	—	—	0.066 (0.084)	0.068 (0.102)
Female x agreeableness	—	—	—	−0.123 (0.140)	−0.233 (0.173)
Female x conscientiousness	—	—	—	0.079 (0.089)	0.264 ^b (0.108)
Female x emotional stability	—	—	—	−0.299 ^a (0.178)	−0.554 ^b (0.217)
Female x intellect or imagination	—	—	—	0.138 (0.175)	0.358 ^a (0.212)
Price x extraversion	—	—	—	—	−0.011 (0.034)
Price x agreeableness	—	—	—	—	−0.058 (0.045)

Table 6 (Continued)

	1 Baseline	2 Baseline with interactions	3 Personality	4 Female- personality	5 Female-price- personality
Price x conscientiousness	—	—	—	—	0.125 ^c (0.031)
Price x emotional stability	—	—	—	—	−0.251 ^c (0.074)
Price x intellect or imagination	—	—	—	—	0.179 ^c (0.069)
Female x price x extraversion	—	—	—	—	0.007 (0.043)
Female x price x agreeableness	—	—	—	—	0.055 (0.072)
Female x price x conscientiousness	—	—	—	—	−0.133 ^c (0.046)
Female x price x emotional stability	—	—	—	—	0.193 ^b (0.092)
Female x price x intellect or imagination	—	—	—	—	−0.152 ^a (0.088)
Constant	16.503 ^c (0.676)	19.472 ^c (0.800)	17.885 ^c (4.307)	16.797 ^c (6.284)	18.225 ^b (7.667)
R ²	0.299	0.317	0.334	0.339	0.351
Observations	2100	2100	1920	1920	1920
Number of id	105	105	96	96	96

Standard errors in parentheses

^aSignificant at 10%; ^bsignificant at 5%; ^csignificant at 1%

Vesterlund (2001). The negative coefficient on the high status variable indicates that those with higher status give less than those who have low status. While statistically significant, the magnitude is about one-quarter less than the relative price coefficient. Interestingly, the status of the other player is irrelevant. The high status-price interaction term is positive and significant, indicating that those with high status give less and are less responsive to changes in the price than those with low status. The giving coefficient, on the other hand, is the same magnitude as the relative price variable, suggesting that people are about as responsive to the framing effect as they are to a nine-fold change in the relative price. Again, there is an interesting price interaction: people are much more responsive to price when they are giving than when they are taking.

In the remaining three columns of Table 6, we expand the specification to include personality factors and/or personality factor interaction variables. The specification in column 3 includes personality factor levels, column 4 adds gender-personality interactions, and column 5 adds price-personality and gender-price-personality interactions. The results described above for status, language, price and the price interactions are qualitatively unchanged across specifications. The two notable exceptions are that the gender and price-gender interaction coefficients are no longer statistically sig-

nificant. In addition, many of the personality, gender-personality, and gender-price-personality interaction variables are statistically significant.¹¹

The interaction variables are included in the regression in an effort to better explain gender differences in behavior relative to differences in personality. In column 5 (the full model) four of the five personality factors are statistically significant. These coefficients represent the level effect of these personality characteristics on average giving for males. The level effect of personality on average giving for females is the sum of the coefficients on personality factors and the coefficients on the gender-personality interaction terms, and for each personality factor the sum is not statistically different from zero. Three of the gender-personality interactions (Conscientiousness, Emotional Stability, and Intellect) are statistically significant, indicating that the level effect of personality on average giving is different between males and females. Therefore, differences in personality between males and females explains any differences in average giving across genders. Combined with the fact that the coefficient on the gender dummy variable is not significant, this means that the effect of gender on behavior is now captured entirely in the gender-personality interaction terms.

While the interaction terms discussed in the previous paragraph allow us to examine the nature of behavioral gender differences in average giving, the three-way interaction terms allow us to examine the nature of behavioral gender differences in price-sensitivity. Three of the five coefficients on the price-personality interactions are statistically significant. These represent the effect of personality on price-sensitivity for males. The effect of personality on price-sensitivity for females is the sum of the coefficients on price, personality, and gender-price-personality variables. Three of the female-price-personality interactions (Conscientiousness, Emotional Stability, and Intellect or Imagination) are statistically significant indicating that the effect of personality on price-sensitivity is different between males and females. As was the case with level effects of personality, any effect on price-sensitivity differences between males and females is now explained entirely in the gender-price-personality interaction terms.¹²

While our results cannot be directly compared to those of Ben-Ner et al. (2004), there are some qualitative similarities as well as a few notable differences between our results and theirs. With regard to personality factors, in our most general specification, we find that four of the five personality factors predict behavior in roughly the same direction and with the same statistical significance as Ben-Ner, Kong, and Putterman, but we find an effect of Intellect or Imagination (Openness in their study) and also Conscientiousness for males, whereas they find no effect in Openness and only find an effect in Conscientiousness for females. Direct comparisons on personality factors between our study and Swope et al. (2008) are even more difficult because we use different measures of personality. However, Swope et. al. do find correlation between

¹¹Likelihood-ratio tests indicate that specification 3 offers a better fit than 2 and specification 5 offers a better fit than 4. This suggests that the personality factor specifications are at least as good as a specification with gender only.

¹²As in Sect. 4.1, results in this subsection are robust to alternative measures of other-regarding behavior. This means that, regardless of the interpretation of the dependent variable, behavioral gender differences are fully explained by differences in personality between men and women.

personality factors and behavior in dictator games. They also conclude that seniority leads a sense of entitlement, which we think is similar to our status effect. The general result from these comparisons between our work and that of Ben-Ner et al. (2004) and Swope et al. (2008) is that, on the whole, measures of personality do predict behavior in these types of games.

Finally, Table 7 shows the estimation of two different specifications. The first includes only gender and interactions between gender and the other treatment variables and specifically excludes the personality factors. The second specification includes the personality factors and relevant interaction effects and intentionally leaves out the gender variables. Our intent is to examine whether the richer personality model is more or less capable than the simpler gender specification in explaining behavior. Since the two specifications are non-nested, a likelihood-ratio test is not appropriate. The Davidson-MacKinnon J-test rejects both models, indicating that the data are not sufficiently rich to distinguish between the gender or personality specifications.¹³ The Akaike and Schwarz information criteria—which adjust for additional explanatory variables—both indicate that the two specifications are roughly similar in their ability to rationalize the behavioral data. This result is consistent with our findings in Table 6, that there is merit to including both gender and personality in explaining behavior. Given this result, the gender specification can be viewed as offering parsimony as its primary strength. The personality specification, on the other hand, offers a more detailed understanding of the heterogeneity across individuals.

5 Conclusion

The experiment in this paper allows for a direct comparison of several different sources of behavioral heterogeneity in other-regarding behavior. A number of previous studies have identified gender effects in other-regarding preferences. The key result of this paper is that gender is important, but in a way that is more subtle than is indicated when personality factors are not included. We show that the personality factors Agreeableness, Conscientiousness, Emotional Stability, and Intellect or Imagination collectively explain behavioral gender differences. That is, only those individuals who score higher or lower than average on these personality factors engage in different behavior across genders.

In addition to the heterogeneity attributed to gender and personality, we also find a number of other effects which are largely consistent with previous research. Status, even when manipulated in a laboratory experiment, seems to matter, indicating that

¹³In the J-test—a variance encompassing test stemming from an artificial nesting model—non-nested specifications are tested against each other by including predicted values from one specification in the regression of the other specification. If you fail to reject the hypothesis that the coefficient on the predicted values is zero, then it can be said that the model from which the predicted values came has no additional explanatory value and we reject that model. Since models are tested against each other in this manner it is possible for both models to be accepted or rejected, thus indicating that data are not rich enough to discriminate between the two models. This is particularly true when sample size is small, when Type I errors are more likely because the t-statistic has the standard normal distribution only asymptotically (Gujarati 2003).

Table 7 Specification: gender or personality? Dependent variable is payoff to other subject, random effects

	Gender specification	Personality specification
Relative price	-6.156 ^c (0.355)	-4.322 ^a (2.233)
Price x high status	0.742 ^b (0.291)	0.469 (0.293)
Female	-4.046 ^c (0.711)	–
Price x female	1.909 ^c (0.302)	–
Price x other high status	-0.018 (0.288)	-0.018 (0.289)
Price x giving	1.192 ^c (0.288)	1.192 ^c (0.289)
High status	-1.526 ^b (0.685)	-1.046 (0.674)
Other high status	0.084 (0.488)	0.084 (0.489)
Giving	-5.545 ^c (0.488)	-5.545 ^c (0.489)
Block	0.621 (0.553)	0.231 (0.549)
Extraversion	–	0.044 (0.047)
Agreeableness	–	-0.032 (0.076)
Conscientiousness	–	-0.123 ^b (0.051)
Emotional stability	–	0.470 ^c (0.094)
Intellect or imagination	–	-0.200 ^b (0.096)
Price x extraversion	–	-0.023 (0.020)
Price x agreeableness	–	0.028 (0.033)
Price x conscientiousness	–	0.052 ^b (0.022)
Price x emotional stability	–	-0.172 ^c (0.041)
Price x intellect or imagination	–	0.065 (0.042)
Constant	19.557 ^c (0.814)	14.641 ^c (5.122)
Observations	1920	1920
Number of id	96	96
Akaike criterion	12680.59	12700.17
Schwarz criterion	12752.87	12816.19
Davidson-MacKinnon J-test	Reject	Reject

Standard errors in parentheses

^aSignificant at 10%;^bsignificant at 5%;^csignificant at 1%

one's position in a social hierarchy affects behavior. We observe that people give more when it is cheap to give and less when it is expensive to give. We also find evidence that framing effects with respect to endowment can have as large an effect as price. Furthermore, our findings on personality are consistent with previous research, and by including these other sources of heterogeneity we allow for additional sophistication not previously explored.

Future research could include a number of items. First, since the current design does not allow us to distinguish between a variety of other-regarding behaviors, an experimental design capable of separating out observationally-equivalent other-regarding behaviors (e.g. altruism vs. efficiency) would be interesting. Second, some personality psychologists suggest that there is a distinction to be made between biological sex and gender. An experiment that is capable of identifying these characteristics as influences on behavior might provide substantial insight into the human decision making process. One potentially fruitful avenue for this kind of research might be to apply our experimental design to different subject populations.

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